Figure 1
Local Exchange Network Structure

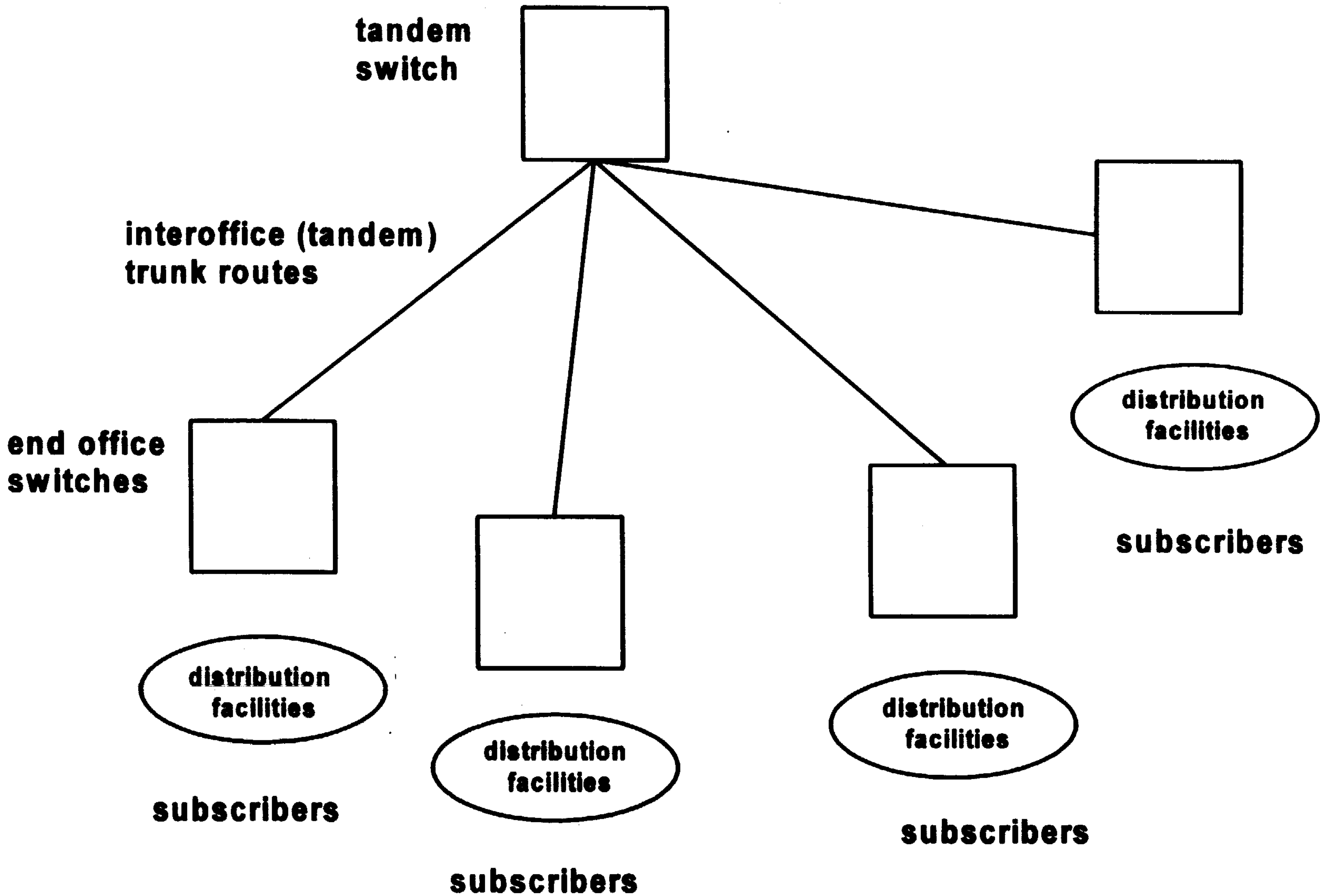


Figure 2
Distribution Network Structure

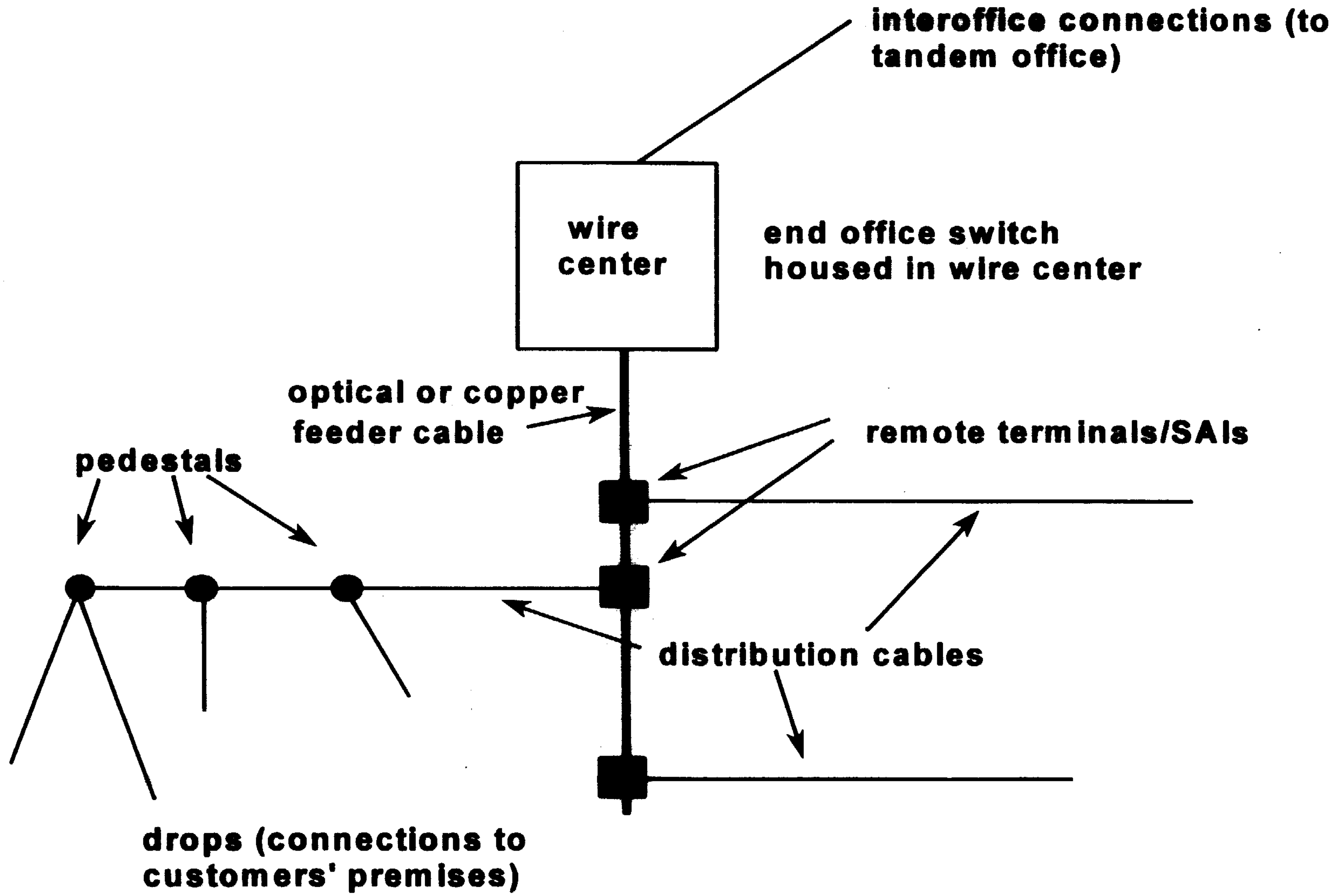


Figure 3
Details of Distribution Network Structure

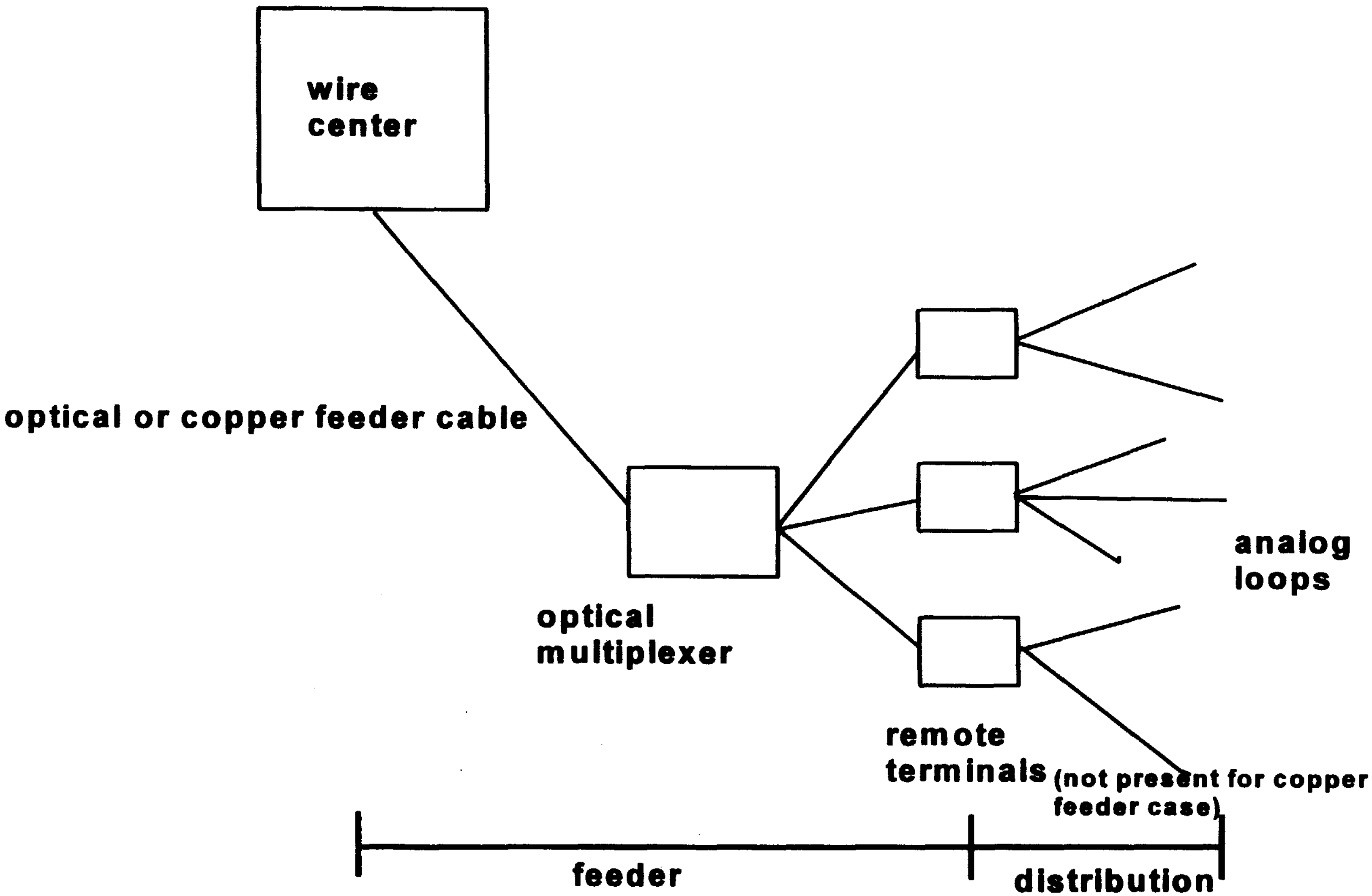
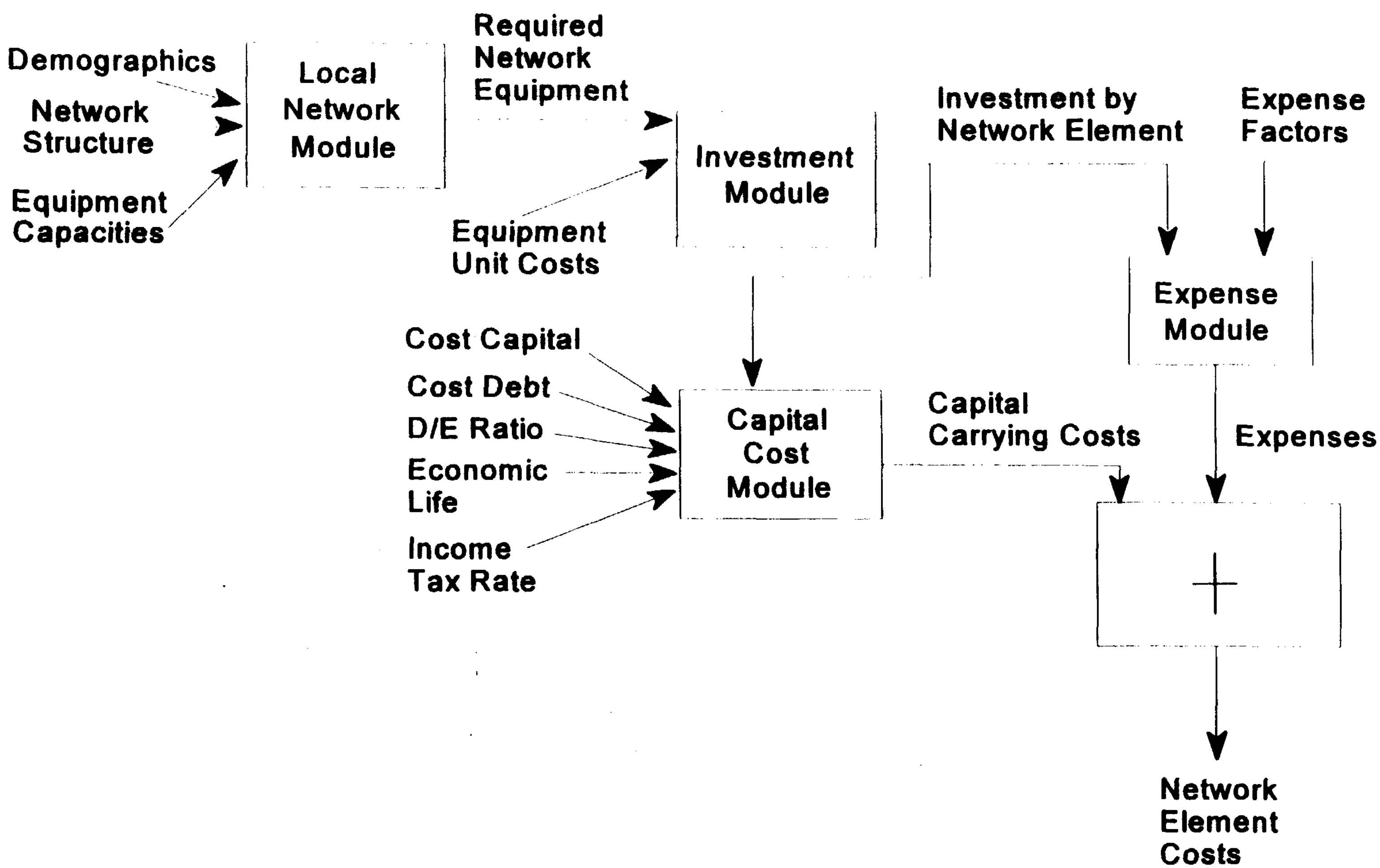


Figure 4
Network Element Cost Modeling Process



2. Loop Investments

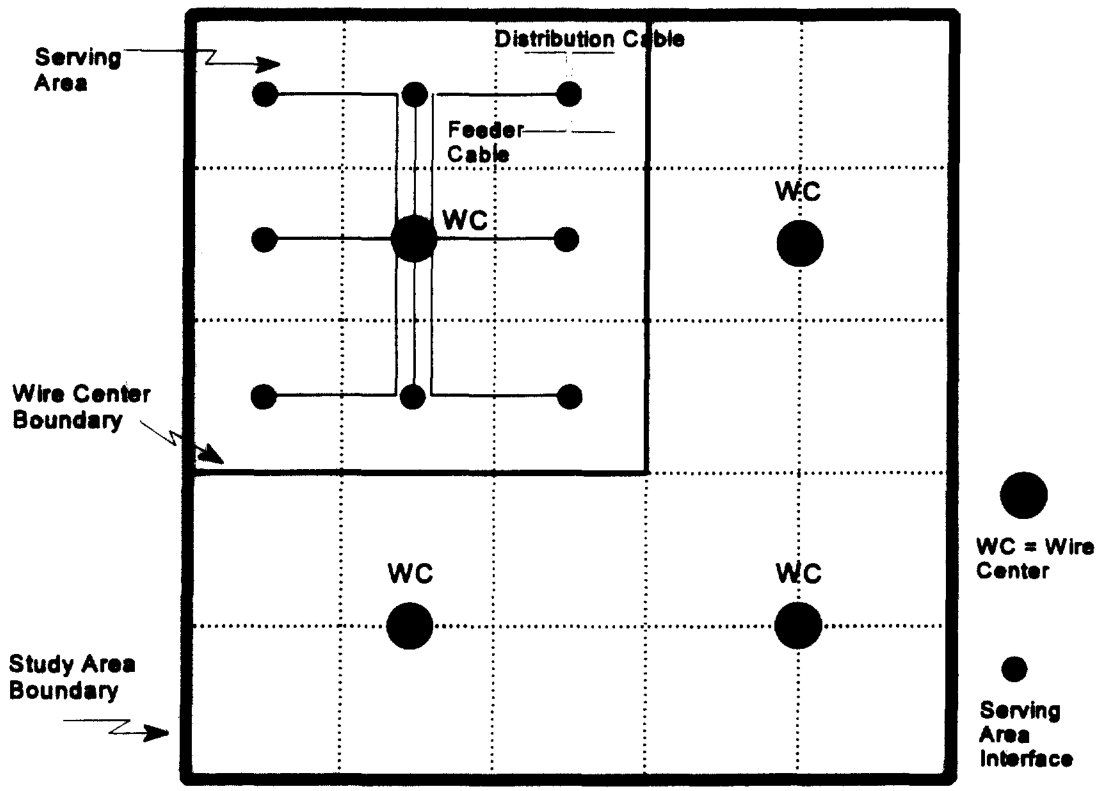
The loop portion of the model uses a combination of buried, underground, and aerial cable in the feeder and distribution segments of the loop plant in each density range. Cable distance calculations are based on a "regular" service area geometry in which the population to be served is assumed to be uniformly distributed in a square study area. This study area is divided into individual serving areas whose dimensions are chosen to allow loop lengths to conform with Bellcore carrier serving area guidelines.

The model equips each serving area with one of two loop architectures. The first uses digital loop carrier remote terminals and, if required, optical multiplexers to serve the contained population. The second uses a "wire pair" architecture, in which individual wire pairs extend all the way from the wire center to the premises. Both architectures include second residential and business lines.

The choice between these architectures is based on an assessment of the lowest-cost means of serving different demographic situations. The digital loop carrier architecture is the choice for the two lowest density zones, while the copper architecture is used for the other zones. Each serving area is equipped with sufficient distribution cable to reach the premises in that serving area.

The distribution network model is depicted in Figure 5. Inputs in this part of the model include cable investment per unit length, installation costs, pole investment and installation, and right-of-way fees.

Figure 5
Distribution Network Model



3. Switching

The model uses three end-office switch "sizes" in the different density ranges: 12,500 line switches in the lowest ranges, 40,000 in the middle ranges, and 60,000 in the highest ranges. In principle, switch capacity may be limited by either the line terminations or by processor capacity ("real time," expressed in terms of busy-hour call attempts). In practice, line terminations turn out to be the limiting factor today.

The model uses Bellcore subscriber traffic assumptions for busy-hour call attempt rates and average holding times.[35] Overall switching system line and processor capacities are consistent with those of such current switches as AT&T's 5ESS and Nortel's DMS-100. The model equips the study area with enough switches to serve the population of that area. The switches are located in wire centers, each of which serves some number of serving areas. This arrangement is also depicted in Figure 5.

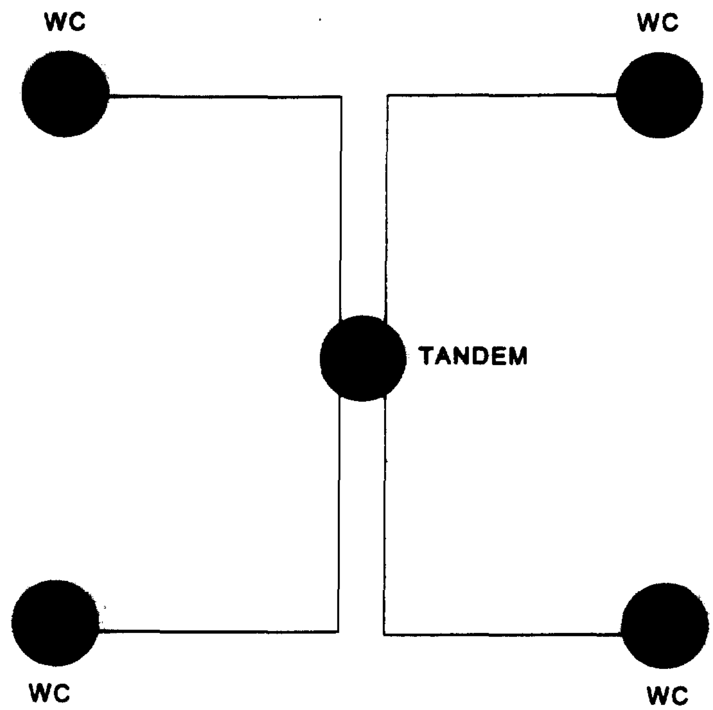
4. Interoffice

The current version of the network model computes investment in interoffice facilities, including tandem trunks and tandem switches. The assumed division of traffic between local and toll is based on the ratio of local to total Dial Equipment Minutes (DEMs), again as reported in the Common Carrier Statistics. The breakdown of toll traffic between intra- and interLATA traffic is also based on FCC statistics.

Interoffice transmission facilities consist of tandem trunks for local interoffice and intraLATA toll traffic, and tandem and direct trunks for access. This part of the model is depicted in Figure 6. The model determines trunk group sizes according to the input traffic assumptions, the total lines served by each switch, and the proportions of local, intraLATA, and interLATA traffic as described earlier. Inputs include maximum busy-hour trunk occupancy, per-channel transmission system investment per mile, and switch trunk port investment.

[35] Bell Communications Research, "LATA Switching System Generic Requirements: Traffic Capacity and Environment," Technical Reference TR-TSY-000517, Issue 3, March, 1989.

FIGURE 6
Interoffice Network Model



Tandem switches are sized by trunk termination and processor capacities. The model determines the overall tandem switch investment by computing the total trunks terminated by each switch and the corresponding number of trunk ports. It then adds the investment in trunk ports to the fixed investment in common equipment to produce a total investment in switching equipment. It multiplies the switch investment by a wire center multiplier to estimate the associated wire center investment.

5. Signaling

The SS7 network assumptions include investments in Signal Transfer Points (STPs), Service Control Points (SCPs), and signaling links. Inputs include assumptions for the numbers of different message types required for the network to route interoffice traffic and to invoke certain CLASS features.[36] Each switching machine is assumed to be connected with two STPs, and the model computes the total investment in STPs and signaling links required to carry the ISUP and TCAP message load generated by the assumed subscriber traffic. Inputs to the signaling calculation include equipment investments and capacities, message length parameters, and percentage of calls requiring TCAP involvement.

6. Operator

An overall operator traffic fraction of two percent of total traffic was used to compute the required investment in operator trunks and operator tandems. Other operator inputs include operator utilization, investment in operator position, and an adjustment factor that accounts for human operator intervention. Most operator traffic now is handled by voice response systems and announcement sets.

B. Current LEC Infrastructure

The network technology assumed in this model is similar in almost every respect to the network currently being deployed by the LECs. The model assumes that all interoffice plant is fiber optic cable, that all central office and tandem switches are digital stored program control switches, and that, where appropriate, loop plant consists of digital loop carrier feeder over fiber optic cables and copper distribution plant. This technological configuration represents the type of network that would be constructed today (i.e., it is a forward-looking network configuration).

The network actually deployed by the LECs today is consistent with this model. Over 80 percent of all RBOC switches were digital in 1993, and the RBOCs have continued to deploy

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[36] The message types are ISUP (Integrated Services Digital Network User Part) messages required for "call control," or network call processing, and TCAP (Transaction Capabilities Applications Part) messages used for database (SCP) transactions.

these switches in their networks since then.[37] While only eight percent of total sheath kilometers of cable is fiber optic, the total number of kilometer miles of fiber has increased by over 500 percent between 1988 and 1994. Interoffice circuit kilometers are 99 percent digital.[38]

The topology assumed by the model is, in fact, somewhat more costly than the network actually in place in some cases. For instance, the model assumes that all interoffice traffic is switched through a tandem. In fact, only a small portion of the actual traffic is switched through a tandem. In the actual network, central offices that exchange high volumes of traffic typically are directly connected, yielding savings both in tandem switching costs and in interoffice trunking costs. Furthermore, the population is assumed to be uniformly distributed in the model. In actuality LECs will deploy their networks to take advantage of population variations, siting wire centers in or near population concentrations where possible.

C. Description of the Expense Model

The recurring costs of the services studied were based on the investment figures generated by the network model. There are three components of the recurring cost component of the model. First, the recurring cost model determines the capital carrying cost for each component of investment associated with the network function. Second, it determines the network-related expenses associated with each component of investment. Finally, it determines non-network-related expenses, and assigns the expenses to the specific network functions.

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[37] See Kraushaar, Jonathan, Infrastructure of the Local Operating Companies Aggregated to the Holding Company Level, FCC, April 1995, Table 9(a).

[38] See, Preliminary Statistics of Common Carriers, *supra*, note 13, p. 157 and ARMIS Report 43-08.

1. Capital Carrying Costs

Capital carrying costs consist of depreciation expenses, the cost of capital (return and interest), and state and federal income taxes. Service lives for various types of equipment are based on current depreciation rates for a large RBOC. As discussed in Section VII, depreciation reserve imbalances for LECs are not large. Therefore, existing depreciation rates are appropriate. A straight-line depreciation method was used.

The return amount was based on an assumed 10 percent overall cost of capital. A 40:60 debt/equity ratio was assumed, with a cost of debt of 7 percent and a cost of equity of 12 percent, for an overall cost of capital of 10 percent.[39] Depreciation results in a declining value of plant in each year, thus affecting the return amount required over time. Therefore, a net present value calculation is used to levelize the return amount over the assumed life of the investment.

The equity component of the return is subject to state and federal income tax. As a consequence, it is necessary to increase the pre-tax return dollars, so that the after-tax return is equal to the assumed cost of capital. An assumed combined 40 percent state and federal income tax rate was used to "gross up" return dollars to achieve this result.

2. Operational Expenses

Three types of expense factors are calculated. Some expenses, such as those associated with Cable and Wire facilities, are assumed to vary directly with capital investment. For these categories, historical expenses are associated with historical investment to develop an investment

[39] In a recent Statement filed at the FCC, Matthew I. Kahal concludes that the current cost of capital is 9.48 percent. See "Statement of Matthew I. Kahal Concerning Cost of Capital," In the Matter of Rate of Return Prescription for Local Exchange Carriers, File No. AAD95-172, March 11, 1996.

factor. This factor is then applied to the equivalent investment amounts developed by the capital investment component of the model to produce an expense estimate.

Other types of expenses, such as Network Operations, are assumed to vary directly with the number of lines provisioned rather than with capital invested. Historical data were used to determine the expense per line for these categories. The factor for Ameritech was used because that company had the lowest costs per line of any RBOC for this category. The resulting per-line factor is applied to the number of lines provisioned. Uncollectibles, operating tax, and sales and marketing factors are calculated as a percentage of revenues.

Certain costs that vary with the size of the firm, and therefore do not meet the economist's definition of overhead, are often included under the classification of General and Administrative expenses. For example, if an LEC did not provide loops, it would be a much smaller company, and would therefore have lower costs. Some of those costs are nonetheless attributed to overhead under current LEC accounting procedures. We therefore include a portion of these "overhead" costs in our TS-LRIC estimates.

Historical overhead expenses for the LECs, such as administration, planning, legal, and human resources, seem excessive when compared to firms that operate in a competitive environment. The relationship between revenues and overhead for selected firms in the auto manufacturing and airline industries was examined. A six percent overhead loading factor was found for these industries. The cost of the functions that this factor is used to estimate should not vary widely across industries. In other words, the relationship between revenues and administration, planning, legal, and human resources are likely to be similar in the telecommunications industry.

The investment model does not directly calculate investments in the following categories: 1) Furniture; 2) Office Equipment; or 3) General Purpose Computers. The recurring cost component of the model calculates investment amounts for these categories by examining the historical relationship between investments in these categories and total company investment. The resulting factor was applied to total investment to estimate investment in these four categories. The recurring cost of these items was then calculated in the same way as recurring cost for investment categories estimated directly by the investment component of the model.

D. Telephone Company Studies

In general, existing LEC cost studies are not useful for establishing the economic cost of unbundled network elements. First, LEC cost studies typically do not measure the TS-LRIC of the network elements. Second, LEC cost of service studies over the years have been plagued by a lack of consistency. Different cost studies have been conducted for different services, often with no consistency among them. For example, a study of local exchange cost might include costs that are not included in studies of toll costs, even though the toll service uses many elements of the network used in providing local service. In short, LEC attempts to justify costs have generally been based on limited information from *ad hoc* studies based on proprietary cost models and methodologies that have not undergone FCC or public scrutiny. One of the primary advantages of pricing well-defined network elements at TS-LRIC is that it will help bring consistency to LEC cost studies.

E. Benchmark Cost Model

As noted above, a group of carriers has developed a cost model, the BCM, for purposes of measuring loop costs. The BCM contains valuable data. The model employed here uses certain BCM inputs concerning cable facility sizes and costs, but adds the modules necessary to estimate unbundled network component costs.

The BCM differs from the original Hatfield Model in several respects. First, it computes loop investment by assigning telephone users in each Census Block Group (CBG) in the country to the nearest existing wire center. CBGs are the smallest geographical entities within which the Bureau of the Census reports statistics, and typically contain a few hundred households, although some may be much smaller. BCM combines NECA data on existing wire center locations with CBG information (which also includes the geographical coordinates of each CBG) to perform the mapping of CBGs to wire centers. As a result, the BCM is a "scorched node" model in that it constructs a new network using existing end-office locations.

The BCM computes the amount of loop facilities required to serve the CBGs that it associates with each wire center. The BCM Model equates households with access lines and thus sizes the loop network to address all households reported for each CBG. It does not include business or second residential lines in its calculations. Once it determines the size and type (copper or optical feeder cable, and copper distribution cable) of facilities necessary to serve the CBGs in the study area, it estimates the investment in cable and corresponding installation costs. The installation costs depend on the size of cable to be installed as well as on certain geological parameters such as bedrock hardness and water table depth that the BCM developers associate with each CBG in the process of producing the state-by-state input data for the model.

After the BCM Model calculates the overall loop investment for each of the CBGs in a study area, it estimates switching investment for each wire center and then computes a monthly service cost per line. The latter calculation involves multiplying the overall loop and switching investment per line in each CBG by each of two constants to estimate total costs. One constant is derived from ARMIS operating expense data for all Tier 1 carriers, and is intended to represent all costs associated with network operation, administration, capital carrying costs for network investment, corporate overhead, marketing, and other expenses. The second constant is based on network and capital expenses, along with taxes and corporate overhead, reported in the original HAI Universal Service cost study. The BCM output separately lists the costs that result from the application of each of the two factors.

HAI has developed a set of "extensions" to BCM that use the BCM-computed loop investments as inputs. The HAI extensions have been presented in several state proceedings. The BCM produces a detailed analysis of loop investment, and the original Hatfield Model included a well-developed analysis of network facilities at the wire center level. The two models are thus complementary, and the Hatfield extensions to BCM take advantage of the best features of both original models. The HAI extensions do not modify the BCM logic in any way.

The present study does not use the new HAI extensions to the BCM Model because it takes considerable time to produce loop investment results for the entire country. Given the limited time available to produce investment and cost results for this Study, it was necessary to employ the original Hatfield Model approach. The version of the model used, however, contains a number of input modifications based on assumptions present in BCM for copper and fiber cable investment and installation costs. It also uses parts of the Hatfield BCM extensions that compute operator services investment and SS7 investments.

VI. HATFIELD STUDY RESULTS

The monthly costs of unbundled network functions estimated by the model are shown in Table 4. End-office switching is 0.18 cents per minute. Loop costs vary substantially by density range. The cost of a loop in the 1,000-5,000 population per square kilometer density range is $6.20 per month. This density range contains18 percent of all loops.

Table 4
Unbundled Switching and Loop Costs

Loops	5.30-40.89	dollars per month
End-office Switching	0.18	cents per minute
Ports	1.02	dollars per month

As discussed in Section VII, these costs are much lower than existing rates based on embedded costs. Appendix 1 contains costs for additional unbundled network elements and more detailed loop results by density range.

The unbundled loop cost results are broadly consistent with the findings discussed in Section II. The switching costs are lower than those found in other studies. The other studies may include mark-ups above TS-LRIC. The difference may also be explained by the green field assumption of a true TS-LRIC study. A network designed from the bottom-up to handle existing traffic loads would have fewer switches than are currently in place. The studies discussed in Section II are undoubtedly based on a "scorched node" approach, in which existing network nodes are retained in the modeling process. As discussed above, economic cost estimates are not constrained by historical investment and network decisions.

VII. EXPLAINING EXCESSIVE RATES

Based on the analysis described in Section V, the total economic cost of the LECs in providing the unbundled network elements underlying their existing services is approximately $36 billion annually. This compares with actual regulated revenue received by the LECs in 1993 of approximately $82 billion. Thus, the total economic cost of unbundled network elements of approximately $82 billion. Thus, the total economic cost of unbundled network elements estimated by our model is approximately 44 percent of the LECs' existing revenue requirement.[40] The gap between the "bottoms up" economic costs and the "tops down" revenue requirement consists of a number of elements, including expenses associated with providing services to end-users, a small amount of economic overhead, and large amounts of overbuilt plant and excess overhead.

Table 5 shows the existing LEC revenue requirement and compares it with the TS-LRIC cost of providing unbundled network elements. The TS-LRIC estimates include General and Administrative expenses associated with provision of the unbundled network elements. Model investment is compared to actual investment and the annual carrying cost of that investment is computed. The annual cost and an eight year amortization of the of the existing depreciation reserve deficiency is calculated. Existing customer operations expenses together with an assignment of the capital cost of General Support Facilities ("GSF") are also shown. Similarly, Corporate Operations expenses, less overhead assigned to Customer Operations, but including a GSF are shown. The remaining amount of the gap represents "other inefficiencies" (including misallocation of nonregulated costs to regulated services).

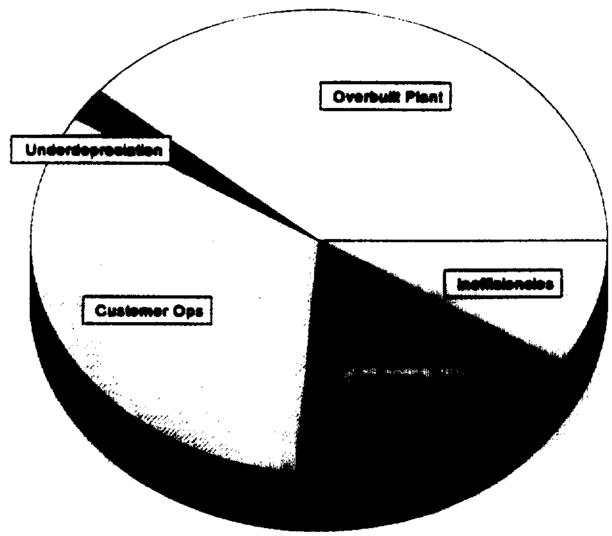
[40] A small part of the discrepancy between economic cost as estimated by the model and the embedded cost base may be due to the exclusion of certain activities from the analysis. For example, the costs of non-recurring activities, such as installing telephone service, are not included. Centrex service and ISDN service are also excluded. However, loops, switching, signaling, and interoffice transport facilities supporting these latter services are included in total investment. Incremental central office features and electronics are not included.

Table 5
Economic Cost Compared to Revenue Requirement

Total Revenues - Tier One Companies		$ 81,997,412,000	
Total TSLRIC Wholesale Cost		36,097,470,452	
The "Gap"		45,899,941,548	$45,899,941,548
Model Investment	$131,320,817,108		
Actual Investment	256,803,243,000		
Overbuilt Plant	125,482,425,892		
Capital Carrying Cost of Overbuilt Plant		17,655,667,327	28,244,274,221
Depreciation Reserve Deficiency	3,314,926,000		
Return & Taxes on Reserve Deficiency		438,306,882	27,805,967,339
Amortization of Reserve Deficiency		414,365,750	27,391,601,589
Customer Operations	13,184,107,220		
Plus: Capital Cost of GSF	2,078,315,021		
Total Customer Operations	15,262,422,241	15,262,422,241	12,129,179,347
Corporate Operations	10,148,262,000		
less: overhead assigned to TS-LRIC	2,165,848,227		
less: overhead for Customer Operations	791,046,433		
Net Corporate Operations	7,191,367,340		
Plus: Capital Cost of GSF	1,133,632,071		
Total Corporate Ops	8,324,999,410	8,324,999,410	3,804,179,937
Uncollectibles	1,068,028	1,068,028	3,803,111,909
Operational Inefficiencies		$3,803,111,909	0

Figure 7 shows the relative magnitude of each of these existing revenue requirement components.

Figure 7
Components of the "Gap"



A. Inefficiencies

Inefficiencies (including excess profits) accounts for $3.8 billion of the gap between TS-LRIC and embedded costs. It is not surprising that there are inefficiencies in the existing LEC cost structure. Rate of return regulation is supposed to limit a monopolist to charging prices that recover no more than its cost plus a reasonable profit. However, this provides well-known incentives for the regulated firm to overinvest. This form of regulation also limits incentives for regulated firms to control their expenses. The LECs have enjoyed a virtual monopoly position for many years. Therefore, it is unreasonable to assume that the LEC organizations are as efficient as they would be in a more competitive environment.

In theory, price cap regulation addresses some of these problems. However, the FCC's price cap regime necessarily retains many elements of rate of return regulation. Moreover, the productivity factors established by the FCC have been too low. Telephone companies have consistently beaten the productivity targets set by the FCC – and by a wide margin. The FCC initiated LEC price caps with a 3.3 percent productivity factor in 1990. Five of the seven RBOCs have now voluntarily adopted a productivity factor of 5.3 percent. AT&T and Ad Hoc have shown that within the framework of price cap regulation, productivity factors of 7.3 percent and 9.9 percent are obtainable.[41] These higher factors are still based on historical performance and are not guaranteed to bring rates to economic cost any time soon, if ever.

LECs are clearly earning excess, i.e., supracompetitive, profits. The FCC has not changed the allowed rate of return in many years. Borrowing costs and the cost of equity have both fallen with the reduction of inflation in the economy since the 1980s. The 10-year Treasury yield has fallen from 8.2 percent in 1984 to around 5.7 percent today.[42] A recent study undertaken for MCI shows that the LEC cost of capital should be reduced to 9.48 percent.[43] LECs subject to price cap regulation have consistently earned above the sharing amounts.

B. Underdepreciation

The depreciation reserve deficiency is a relatively small portion of total LEC plant in service. Regulators have been liberalizing depreciation policies since the 1970s. As a result,

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[41] See, Price Cap Performance Review for Local Exchange Carriers, CC Docket No. 94-1, January 11, 1996, "Comments of AT&T" and "Comments of the Ad Hoc Telecommunications Users Committee," filed January 11, 1996.

[42] See, Kahal Statement, *supra*, note 39.

[43] *Id.*

past depreciation reserve imbalances have been largely eliminated and local telephone networks have been modernized.

A recent study performed for MCI shows that "changes in FCC depreciation practices during the 1980's have effectively reduced the reserve deficit. Unrecovered depreciation expenses have fallen from $21 billion in 1983 to $3.3 billion in 1994."[44] This study found that a large portion of the difference between depreciation prescriptions and telephone company requests is in the area of copper loop plant. However, more rapid depreciation of loop plant and replacement with fiber is not necessary for the provision of current monopoly services or the unbundled network elements modeled here.

One explanation for the low depreciation reserve deficiency is that, as Table 6 shows, LECs have been modernizing their networks. Fiber transmission, digital switching and SS7 are widely deployed in local networks. Analog switching accounts for only 28 percent of total RBOC switching investment in 1994.[45] The LECs continue to add digital switches at a rapid rate.

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[44] See, Baseman, Kenneth C. and Harold Van Gieson, Depreciation Policy in the Telecommunications Industry: Implications for Cost Recovery by the Local Exchange Carriers, December, 1995, p.2.

[45] See, Preliminary Statistics of Common Carriers, *supra*, note 13, July 7, 1995, Table 2-10.

Table 6
Modern Technology Deployment

Technology	1989	1990	1991	1992	1993	Percent Change
Fiber Sheath Kilometers	150,512	203,657	245,149	290,498	357,394	237
Digital Stored Program Control Switching	8,469	9,796	11,525	12,739	15,157	78
SS7-317 Switches (Intra-LATA)	908	2,588	4,091	7,479	9,198	1,013

Source: Kraushaar, J.M., "Infrastructure of the Local Operating Companies Aggregated to the Holding Company Level," Industry Analysis Division, Common Carrier Bureau, FCC, April 1995.

C. Overcapacity

As discussed above, modern technology is widely deployed in LEC networks. Therefore, the excess capital investment shown in this analysis is not driven by the use of obsolete plant. Instead, excess capacity appears to be a significant source of the problem. The difference between the Hatfield Model investment and actual LEC investment is $125 billion dollars, resulting in an annual capital carrying cost of $17.7 billion dollars. This is approximately 20 percent of the existing revenue requirement. Several possible sources of this overinvestment are described below.

There has been very little oversight of LEC investment plans by the FCC. Telephone companies have basically been free to upgrade network capacity and capabilities in anticipation of entry into competitive markets, and at the expense of current monopoly ratepayers. This excess capacity can manifest itself in terms of both excess facilities and excess capabilities.[46] An example of the latter is building functionality or capability into today's networks that is needed for future competitive services. This form of cross-subsidy is difficult to detect in the absence of

[46] See, Baseman, Kenneth, "Open Entry and Cross-Subsidization in Regulated Markets," in Gary Fromm, ed., Studies in Public Regulation, 1981.

the economic cost modeling performed here. A benchmark cost for providing unbundled network elements without excess capacity or capability must be established. As discussed above, the FCC has not engaged in this type of modeling. One limited exception has been in the area of video dialtone, which is discussed immediately below.

1. Broadband Service

The FCC did ask for economic support for the investments associated with LEC plans to enter the broadband video business through video dialtone investments. While events have overtaken those Applications, the record demonstrated that many video dialtone investments would have been profitable only if monopoly ratepayers absorbed much of the cost.[47] In the Bell Atlantic Dover Township Video Dialtone Tariff Investigation Designation Order, the FCC set out to investigate these costing issues.[48] This raises a question concerning the degree of overinvestment by LECs in areas where the FCC has devoted less (i.e., virtually no) scrutiny.

2. Official Service Networks

The RBOCs were granted the authority under the MFJ to construct interLATA official services networks. The FCC has never undertaken an investigation of the investment in official service networks, even though the RBOCs had a clear incentive to build excess capacity in those networks in contemplation of entry into the interLATA market.[49] Any expenses associated with

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[47] See, In the Matter of U S WEST Communications, Inc., Trial Services or Arrangements, Basic Video Dialtone Market Trial, Omaha, NE; NCTA Position to Reject, April 24, 1995. Also, In the Matter of SNET Video Dialtone Trial Tariff, NCTA Comments on SNET's Accounting and Cost Allocation Plan, March 29, 1995.

[48] See In the Matter of Bell Atlantic Telephone Companies Revisions to Tariff F.C.C. No. 10, CC Docket No. 95-145, released September 8, 1995.

[49] The potential cross-subsidy associated with RBOC construction of official service networks is discussed in Economics and Technology, Inc. and Hatfield Associates, Inc., The Enduring Local Bottleneck, 1994, pp. 198-200.

excess capacity and capabilities not needed by current monopoly ratepayers would reduce sharing under price caps, leading to higher access charges.

Data concerning the investment in these networks is sparse. However, in a regulatory proceeding in Florida, Joseph Gillan discovered that Southern Bell's official services network contained an enormous amount of excess capacity. He found that the idle capacity in Southern Bell's network exceeded the existing size of the entire toll market by 50 percent. He also found that Southern Bell's interlata network capacity, measure in terms of fiber pairs, is at large as AT&T's and at least twice as large as the second largest carrier.[50]

An indication of the degree to which there is excess capacity in RBOC networks is provided by a comparison of working and equipped channels. FCC data show that only 34 percent of RBOC fiber miles are "lit."[51] As a recent FCC Report notes, ". . . there is a huge amount of fiber capacity presently unused in the *interoffice* transmission plant."[52]

3. Loop Investment

The LECs also may have substantial excess capacity in loops. The model used here employs fill factors between .5 and .7, depending on density. The BCM Model uses a fill factor range of between .25 and .75. Actual fill factors in LEC networks may be lower. Some of this excess loop capacity may be explained by LECs putting capacity in place for Centrex service

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[50] See Testimonyof Joseph Gillan, In re: Comprehensive Review of the Revenue Requirements and Rate Stabilization Plan of Southern Bell Telephone and Telegrph Company, Florida Public Service Commission, Docket No. 920260-TL, November 8, 1993, pp. 20-26.

[51] See, ARMIS Report 43-08 data.

[52] See, Infrastructure of the Local Operating Companies Aggregated to the Holding Company Level, April, 1995, *supra,* note 37, p. 6 emphasis supplied.

demand that has not yet materialized.[53] There may also be significant unused capacity for multiple residential lines.

LECs are not penalized for spare loop capacity because the cost is allocated to services based on working loops and collected from ratepayers. Thus, even though Centrex is an unregulated, or loosely regulated, service in many states, local service ratepayers are paying for the unused capacity. As demand for second lines grows, the LECs are in a position to generate substantial revenues.[54]

D. Corporate Operations

It would not be appropriate to add the corporate operations expenses shown in Table 5 to the TS-LRIC of unbundled network elements. The Hatfield Model already includes a factor to estimate expenses included in the corporate operations categories that may vary with firm size. The model does not estimate pure economic overhead. These are expenses that do not vary with firm size.

Pure economic overhead is likely to be a small percentage of the total revenue requirement. Certainly, less than one percent of total revenue requirement for large firms such as the LECs would be required to pay for the "president's desk." To the extent the remaining corporate operations expenses are larger than this amount, they are likely paying for activities related to entering new markets, or simply represent waste and inefficiency.

LECs argue that the TS-LRIC prices of unbundled network elements should be marked up to recover overheads. However, to the extent the expenses are legitimate, it is more

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[53] See, The Enduring Local Bottleneck, *supra*, note 49, pp. 206-212.

[54] The Hatfield Model includes current second line demand and allows for increased demand to the extent that fill levels on the network are below capacity.